

State of Missouri

Draft Rule Amendment 10 CSR 20-7.031 Water Quality Standards



Missouri Department of Natural Resources
Water Protection and Soil Conservation Division
Water Protection Program

March 2, 2005

Title 10—DEPARTMENT OF NATURAL RESOURCES
Division 20—Clean Water Commission
Chapter 7—Water Quality

Proposed Amendment

10 CSR 20-7.031 Water Quality Standards. The Department of Natural Resources is amending (1)(C)8. to state all waters listed in Tables G and H will be designated for whole body contact recreation, (1)(C)9. to revise the definition of boating and canoeing and rename the use to secondary contact recreation, (1)(E) to add definition of catastrophic storm event, (1)(G) to add definition of early life stages, (1)(L)/(M) to update the name change of Geological Survey and Resource Assessment Division, (1)(M)/(N) to add language to clarify mixing zone implementation, revise definitions of 7-day Q10 and 60-day Q10, and add definitions of 30-day Q10 and 1-day Q10, (1)(S) to add definition of reference lakes or reservoirs, (1)(V) to add definition of water effect ratio, (1)(T)/(W) to clarify hardness definition regarding the twenty-fifth percentile, (1)(Y) to add definition of waters of the state, (2)(D) to add language for antidegradation policy implementation development, (4)(A)/3. to remove language associated with site-specific dissolved oxygen, (4)(A)/5./4. to not allow a mixing zone exemption for streams with seven (7)-day Q10 low flows of less than 0.1 cfs and remove any reference to classification (e.g., Class C streams, (4)(A)/6./5. to add language for wetland specific criteria derivation methods, (4)(B)1. to remove language associated with site-specific criteria for Tables A and B, (4)(B)2.B. to change analysis method for metals in drinking water supplies, (4)(B)6. to add language referencing hardness dependant metals criteria for aquatic life in Table A, (4)(B)7. to add language explaining the revised total ammonia nitrogen criteria in Table B, (4)(C) to revise language for bacterial indicator change and bacterial high flow exemption, (4)(E) to clarify unit of measurement for pH, (4)(L)/3. to remove language for sulfate and chloride site-specific criteria, (4)(R) to add language for site-specific criteria methods for all water quality criteria for the protection of aquatic life, (7) to revise language for Outstanding National Resource Waters to be consistent with the antidegradation policy, (8) to revise language for Outstanding State Resource Waters to be consistent with the antidegradation policy, Table A to revise criteria and correct typographical mistakes, Table B to replace existing ammonia criteria with new criteria, Table C to correct minor errors, Table E to correct minor errors and add Bull Creek, Table G to correct minor errors and designate all waters for whole body contact recreation, Table H to correct minor errors and designate all waters for whole body contact recreation, and Table I to revise entries.

PURPOSE: This amendment fulfills an obligation under 40 CFR 131.20, which requires a state to review its water quality standards at least once every 3 years. The following outlines draft changes to Missouri's Water Quality Standards (WQS) resulting from meetings with stakeholders, EPA, and department staff.

The addition of seven definitions (catastrophic storm event, early life stages, 30-day Q10, 1-day Q10, reference lakes or reservoirs, water effect ratio, and waters of the state) and language to existing definitions (whole body contact recreation, boating and canoeing/secondary contact recreation, and low-flow conditions) will better clarify the Water Quality Standards.

In 2001, the Missouri Department of Natural Resources (MDNR or Department) Division of Geology and Land Survey officially changed its title to the Geological Survey and Resource Assessment Division. Therefore, it is necessary to modify language in the WQS to reflect the change.

Missouri currently has an approved antidegradation policy but does not have an antidegradation implementation procedure. Language is included in this proposed amendment that provides for the development and use of antidegradation implementation procedures.

Language referencing modification of water quality standards and/or site specific criteria can be found in Missouri's dissolved oxygen criteria, Tables A and B criteria, and sulfate and chloride criteria. Although federal guidance allows site-specific adjustment of water quality criteria, EPA disapproved part of the language describing the application of specific criteria to waters with natural concentrations of dissolved oxygen below criteria. In response, the site-specific criteria language in each of the listed paragraphs above will be removed and subsection R added, which describes the site-specific criteria development methods for the protection of aquatic life for all water quality standards.

Allowing mixing zones of any size in streams with a seven (7)-day Q₁₀ of less than 0.1 cfs might not protect the aquatic life communities under all hydrological circumstances. Therefore the allowance for mixing zones in streams with seven (7)-day Q₁₀ low flows of less than 0.1 cfs will not be allowed.

Language was added to 10 CSR 20-7.031(4) that reflects a more detailed method for how wetlands could be assigned specific criteria.

Missouri currently uses the dissolved metal analytic method for compliance with drinking water standards, which differs from federal criteria. Therefore, all drinking water supply metals shall be analyzed using the total recoverable method.

Metals criteria for aquatic life protection were recalculated using the most recent toxicity data sets that included genus *Ceriodaphnia*. The metals affected by this recalculation include cadmium, trivalent chromium (Cr^{+3}), hexavalent chromium (Cr^{+6}), copper, lead, nickel, silver, and zinc. The results of these criteria recalculations are equation based and, with the exception of hexavalent chromium, are hardness dependent. Also, the values in the table will be revised and based on the lowest (most protective) hardness value in the range listed.

New total ammonia nitrogen criteria was published in December 1999 by USEPA. Advances in research methods and increases in funding have allowed toxicologists to more accurately assess the toxicity of ammonia to aquatic life. The new ammonia criteria will be adopted to reflect improvements to the current (1984/88) criteria.

Missouri has been strongly encouraged to adopt EPA's Ambient Water Quality Criteria for Bacteria—1986 for whole body contact recreation. Therefore, *E. coli* will be adopted as indicator bacteria and the 1986 criteria will apply for water bodies with whole body contact and secondary contact recreation designations.

Missouri currently allows exceedance of bacteria limits during periods of storm water runoff (high flow exemption). As currently stated, the high flow exemption might not ensure that whole body contact recreation is adequately protected. Also of concern, the high flow exemption is broad and qualitative. Therefore, the high flow exemption will be revised and moved to 10 CSR 20-7.015 Effluent Regulations.

It has been stated that a couple of Missouri's WQS are inconsistent and/or conflict with the Antidegradation Policy. Maintaining consistency with Tier III in 10 CSR 20-7.031(2)(C), all dischargers into Outstanding National Resource Waters (ONRWs) and Outstanding State Resource Waters (OSRWs) or into their watershed must be subject to special effluent limitations as required in 10 CSR 20-7.015(6).

Several parameters in 10 CSR 20-7.031, Table A—Criteria for Designated Uses are currently inconsistent with federal criteria. The human health protection—fish consumption criteria affected include 2,4,6-trichlorophenol; *n*-nitrosopyrrolidene; 4-4'-DDE; 4-4'-DDE; and chloroform. The drinking water supply criteria affected include 2,3,7,8-TCDD (dioxin); trihalomethanes; dichlorobromomethane; methylene chloride. The criteria affected for the protection of both human health—fish consumption and drinking water supply include 1,2,4,5-tetrachlorobenzene; pentachlorobenzene; 4-4'-DDT; bis (chloromethyl) ether; bromoform; chlorodibromomethane; tetrachloroethylene; and 1,2-dichloropropane. All of the above criteria were changed to match federal criteria.

During EPA's review of 10 CSR 20-7.031, Table C—Water Bodies Designated for Cold-Water Fisheries with Tables G—Lake Classification and Use Designation and H—Stream Classification and Use Designations, six waters designated for cold water fisheries had reduced mileage or were removed during past revisions. These waters have been restored to Table C and include the addition of Bull Shoals Lake (Ozark county) and Indian Cr. (Franklin/Washington counties) and corrections to L. Piney Creek (Phelps county), N. Fork White River (Ozark county), S. Indian Creek (Newton/McDonald county), and Spring Cr. (Douglas/Ozark county).

During the June 18, 2003 meeting, the Missouri Clean Water Commission directed staff to propose Bull Creek for Outstanding State Resource Water status. Bull Creek will be added for the mileage located within the Mark Twain National Forest in Christian County.

Several changes were made to 10 CSR 20-7.031, Table G—Lake Classification and Use Designation and Table H—Stream Classification and Use Designations to rectify discrepancies stated by EPA. A few changes requested by EPA were not needed due to misunderstandings or lack of information provided by the Department during the last review.

Section 101(a)(2) of the CWA establishes as a national goal "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and ... recreation in and on the water," wherever attainable. This national goal is commonly referred to as the "fishable/swimmable" goal. Missouri currently lists all classified waters for aquatic life, but selectively lists water bodies for whole body contact recreation. Therefore all waters listed in 10 CSR 20-7.031 Tables G and H will be immediately designated for whole body contact recreation and an implementation schedule will be included within which affected permitted facilities must comply with the revised standard.

Several changes were made to 10 CSR 20-7.031, Table I—Biocriteria Reference Locations due to water withdrawal for irrigation, accessibility limitations, and refinement of selection processes.

When discovered, typographical errors found in the rule were corrected.

(1) Definitions.

(A) Acute toxicity—Conditions producing adverse effects or lethality on aquatic life following short-term exposure. The acute criteria in Tables A and B are maximum concentrations which protect against acutely toxic conditions. Acute toxicity is also indicated by exceedence of whole-effluent toxicity (WET) test conditions of paragraph (3)(I)2. For substances not listed in Table A or B, 0.3 of the median lethal concentration, or the no observed acute effect concentration for representative species, may be used to determine absence of acute toxicity.

(B) Aquifer—A subsurface water-bearing bed or stratum which stores or transmits water in recoverable quantities that is currently being used or could be used as a water source for private or public use. It does not include water in the vadose zone.

(C) Beneficial water uses. Beneficial uses (1)(C)1.-11. of classified waters are identified in Tables G and H. Beneficial uses (1)(C)12.-15. of classified waters must be determined on a site-by-site basis and are therefore not listed in Tables G and H.

1. Irrigation—Application of water to cropland or directly to plants that may be used for human or livestock consumption. Occasional supplemental irrigation, rather than continuous irrigation, is assumed.

2. Livestock and wildlife watering—Maintenance of conditions to support health in livestock and wildlife.

3. Cold-water fishery—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a naturally reproducing or stocked trout fishery and other naturally reproducing populations of recreationally important fish species.

4. Cool-water fishery—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a sensitive, high-quality sport fishery (including smallmouth bass and rock bass) and other naturally reproducing populations of recreationally important fish species.

5. Protection of aquatic life (General warm-water fishery)—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a wide variety of warm-water biota, including naturally reproducing populations of recreationally important fish species. This includes all Ozark Class C and P streams, all streams with seven (7)-day Q10 low flows of more than one-tenth cubic feet per second (0.1 cfs), all P1 streams and all classified lakes. However, individual Ozark Class C streams may be determined to be limited warm-water fisheries on the basis of limited habitat, losing-stream classification, land-use characteristics or faunal studies which demonstrate a lack of recreationally important fish species.

6. Protection of aquatic life (Limited warm-water fishery)—Waters in which natural water quality and/or habitat conditions prevent the maintenance of naturally reproducing populations of recreationally important fish species. This includes non-Ozark Class C streams and non-Ozark Class P streams with seven (7)-day Q10 low flows equal to or less than 0.1 cfs and Ozark Class C streams with the characteristics outlined in paragraph (1)(C)5.

7. Human health protection (Fish consumption [*and secondary contact recreation*])—Criteria to protect this use are based on the assumption of an average amount of fish consumed on a long-term basis. Protection of this use includes compliance with [*Federal*] **Food and Drug Administration (FDA)** limits for fish tissue, maximum water concentrations corresponding to the 10^{-6} cancer risk level and other human health fish consumption criteria. [*Secondary contact recreation assumes limited physical contact with the water without likelihood of water ingestion.*]

8. Whole [-]body [-]contact recreation—Activities in which there is direct human contact with the raw surface water to the point of complete body submergence. The raw water may be ingested accidentally and certain sensitive body organs, such as the eyes, ears and the nose, will be exposed to the water. Although the water may be ingested accidentally, it is not intended to be used as a potable supply unless acceptable treatment is applied. Water so designated is intended to be used for swimming, water skiing or skin diving. **All waters in Tables G and H of this rule are designated for whole body contact recreation. The use designation for whole body contact recreation may be removed or modified through a Use Attainability Analysis (UAA). Assignment of this use does not grant an individual the right to trespass when a land is not open to and accessible by the public through law or written permission of the landowner.**

A. Category A—This category applies to those water segments that have been established by the property owner as public swimming areas allowing full and free access by the public for swimming purposes and waters with existing whole body contact recreational use(s). Examples of this category include, but are not limited to, public swimming beaches and property where whole body contact recreational activity is open to and accessible by the public through law or written permission of the landowner.

B. Category B—This category applies to waters designated for whole body contact recreation not contained within category A.

9. *[Boating and canoeing]* **Secondary contact recreation**—*[Activities in which limited contact with water is assumed]* **Uses include fishing, wading, commercial and recreational boating, any limited contact incidental to shoreline activities, and activities in which users do not swim or float in the water. These recreational activities may result in contact with the water that is either incidental or accidental and the probability of ingesting appreciable quantities of water is minimal. Assignment of this use does not grant an individual the right to trespass when a land is not open to and accessible by the public through law or written permission of the landowner.**

10. Drinking water supply—Maintenance of a raw water supply which will yield potable water after treatment by public water treatment facilities.

11. Industrial process water and industrial cooling water—Water to support various industrial uses; since quality needs will vary by industry, no specific criteria are set in these standards.

12. Storm- and flood-water storage and attenuation—Waters which serve as overflow and storage areas during flood or storm events slowly release water to downstream areas, thus lowering flood peaks and associated damage to life and property.

13. Habitat for resident and migratory wildlife species, including rare and endangered species—Waters that provide essential breeding, nesting, feeding and predator escape habitats for wildlife including waterfowl, birds, mammals, fish, amphibians and reptiles.

14. Recreational, cultural, educational, scientific and natural aesthetic values and uses—Waters that serve as recreational sites for fishing, hunting and observing wildlife; waters of historic or archeological significance; waters which provide great diversity for nature observation, educational opportunities and scientific study.

15. Hydrologic cycle maintenance—Waters hydrologically connected to rivers and streams serve to maintain flow conditions during periods of drought. Waters that are connected hydrologically to the groundwater system recharge groundwater supplies and assume an important local or regional role in maintaining groundwater levels.

(D) Biocriteria—Numeric values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters that have been designated for aquatic-life protection.

(E) Chronic toxicity—Conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic numeric criteria in Tables A and B are maximum concentrations which protect against chronic toxicity; these values shall be considered four (4)-day averages. Chronic toxicity is also indicated by exceedence of WET test conditions of subsection (4)(P). For substances not listed in Table A or B, commonly used endpoints such as the no-observed effect concentration or inhibition concentration of representative species may be used to demonstrate absence of toxicity.

(F) Classified waters—All waters listed as L1, L2 and L3 in Table G and P, P1 and C in Table H. During normal flow periods, some rivers back water into tributaries which are not otherwise classified. These permanent backwater areas are considered to have the same classification as the water body into which the tributary flows.

1. Class L1—Lakes used primarily for public drinking water supply.

2. Class L2—Major reservoirs.

3. Class L3—Other lakes *[which]* **that** are waters of the state. These include both public and private lakes.

For effluent regulation purposes, publicly owned L3 lakes are those for which a substantial portion of the surrounding lands are publicly owned or managed.

4. Class P—Streams that maintain permanent flow even in drought periods.

5. Class P-1—Standing-water reaches of Class P streams.

6. Class C—Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.

7. Class W—Wetlands that are waters of the state that meet the criteria in the Corps of Engineers Wetlands Delineation Manual (January 1987), and subsequent federal revisions. Class W waters do not include wetlands that are artificially created on dry land and maintained for the treatment of mine drainage, stormwater control, drainage associated with road construction, or industrial, municipal or agricultural waste. Class W determination on any specific site shall be consistent with federal law.

(G) Early Life Stages—The pre-hatch embryonic period, the post-hatch free embryo or yolk-sac fry, and the larval period during which the organism feeds. Juvenile fish, which are anatomically rather similar to adults, are not considered an early life stage.

[(G)] **(H) Ecoregion**—A major region within the state which contains waters with similar geological, hydrological, chemical and biological characteristics.

[(H)] **(I) Epilimnion**—Zone of atmospheric mixing in a thermostratified lake.

[(I)] **(J) Fecal coliform bacteria**—A group of bacteria originating in intestines of warm-blooded animals which indicates the possible presence of pathogenic organisms in water.

[(J)] **(K) Hypolimnion**—Zone beneath the zone of atmospheric mixing in a thermostratified lake.

[(K)] **(L) Lethal concentration₅₀ (LC₅₀)**—Concentration of a toxicant which would be expected to kill fifty percent (50%) of the individuals of the test species organisms in a test of specified length of time.

[(L)] **(M) Losing stream**—A stream which distributes thirty percent (30%) or more of its flow during low flow conditions through natural processes, such as through permeable geologic materials into a bedrock aquifer within two (2) miles' flow distance downstream of an existing or proposed discharge. Flow measurements to determine percentage of water loss must be corrected to approximate the seven (7)-day Q10 stream flow. If a stream bed or drainage way has an intermittent flow or a flow insufficient to measure in accordance with this rule, it may be determined to be a losing stream on the basis of channel development, valley configuration, vegetation development, dye tracing studies, bedrock characteristics, geographical data and other geological factors. Losing streams are listed in Table J; additional streams may be determined to be losing by the *[Division of Geology and Land Survey]*

Geological Survey and Resource Assessment Division.

[(M)] **(N) Low-flow conditions.** **Where used in this regulation in the context of mixing zones, the low-flow conditions shall refer to the minimum amount of stream flow occurring immediately upstream of a wastewater discharge and available, in whole or in part, for dilution or assimilation of wastewater discharges.**

1. Seven (7)-day, one (1)-in-ten (10)-year low flow (7-day Q10)—The **lowest** average *[minimum]* flow for seven (7) consecutive days that has a probable recurrence interval of once-in-ten (10) years; and

2. Sixty (60)-day, one (1)-in-two (2)-year low flow (60-day[,] Q[1]/2)—The **lowest** average *[minimum]* flow for sixty (60) consecutive days that has a probable recurrence interval of once-in-two (2) years.

3. Thirty (30)-day, one (1)-in-ten (10)-year low flow (30-day Q10)—The lowest average flow for thirty (30) consecutive days that has a probable recurrence interval of once-in-ten (10) years; and

4. One (1)-day, one (1)-in-ten (10)-year low flow (1-day Q10)—The lowest average flow for one (1) day that has a probable recurrence interval of once-in-ten (10) years.

[(N)] **(O) Mixing zone**—An area of dilution of effluent in the receiving water beyond which chronic toxicity criteria must be met.

[(O)] **(P) Outstanding national resource waters**—Waters which have outstanding national recreational and ecological significance. These waters shall receive special protection against any degradation in quality. Congressionally designated rivers, including those in the Ozark national scenic riverways and the wild and scenic rivers system, are so designated (see Table D).

[(P)] **(Q) Outstanding state resource waters**—High quality waters with a significant aesthetic, recreational or scientific value which are specifically designated as such by the Clean Water Commission (see Table E).

[(Q)] **(R) Ozark streams**—Streams lying within the Ozark faunal region as described in the Aquatic Community Classification System for Missouri, Missouri Department of Conservation, 1989.

(S) Reference lakes or reservoirs—Lakes or reservoirs determined by Missouri Department of Natural Resources to be the best available representatives of ecoregion waters in a natural condition with respect to habitat, water quality, biological integrity and diversity, watershed land use, and riparian conditions.

[(R)] **(T) Reference stream reaches**—Stream reaches determined by the department to be the best available representatives of ecoregion waters in a natural condition, with respect to habitat, water quality, biological integrity and diversity, watershed land use and riparian conditions.

[(S)] **(U) Regulated-flow streams**—A stream that derives a majority of its flow from an impounded area with a flow-regulating device.

(V) Water effect ratio—Appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

[(T)] **(W) Water hardness**—The total concentration of calcium and magnesium ions expressed as calcium carbonate. For purposes of this rule, hardness will be determined by the **lower** twenty-fifth percentile value[, *so that no more than twenty-five percent (25%) of samples fall below the value*] of a representative number of samples from the water body in question or from a similar water body at the appropriate stream flow conditions.

[(U)] **(X) Water quality criteria**—Chemical, physical and biological properties of water that are necessary to protect beneficial water uses.

(Y) Waters of the State—All rivers, streams, lakes, and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased, or otherwise controlled by a single person or by two or more persons jointly or as tenants in common and includes waters of the United States lying within the state.

[(X)] **(Z) Wetlands**—Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically

adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. This definition is consistent with both the United States Army Corps of Engineers 33 CFR 328.3(b) and the United States Environmental Protection Agency 40 CFR 232.2(r).

[Y] **(AA)** Whole effluent toxicity tests—A toxicity test conducted under specified laboratory conditions on specific indicator organisms. To estimate chronic and acute toxicity of the effluent in its receiving stream, the effluent may be diluted to simulate the computed percent effluent at the edge of the mixing zone or zone of initial dilution.

[V] **(BB)** Zone of initial dilution—A small area of initial mixing below an effluent outfall beyond which acute toxicity criteria must be met.

[W] **(CC)** Zone of passage—A continuous water route necessary to allow passage of organisms with no acutely toxic effects produced on their populations.

[Z] **(EE)** Other definitions as set forth in the Missouri Clean Water Law and 10 CSR 20-2.010 shall apply to terms used in this rule.

(2) Antidegradation. The antidegradation policy shall provide three (3) levels of protection.

(A) **Tier One.** Public health, existing in-stream water uses and a level of water quality necessary to protect existing uses shall be maintained and protected.

(B) **Tier Two.** For all waters of the state, if existing water quality is better than applicable water quality criteria established in these rules, that existing quality shall be fully maintained and protected. Water quality may be lowered only if the state finds, after full satisfaction of the intergovernmental coordination and public participation requirements, that the lowered water quality is necessary to allow important economic and social development in the geographical area in which the waters are located. In allowing the lowering of water quality, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control before allowing any lowering of water quality. This provision allows a proposed new or modified point or nonpoint source of pollution to result in limited lowering of water quality provided that

1. The source does not violate any of the general criteria set fourth in section (3) of this rule, or any of the criteria for protection of beneficial uses set forth in section (4) of this rule;

2. The source meets all applicable technological effluent limitations and minimum standards of design for point sources or minimum pollution control practices for nonpoint sources; and

3. The lowering of water quality, in the judgment of the department, is necessary for the accommodation of important economic and social development in the geographical vicinity of the discharge. In making a preliminary determination based on socioeconomic development considerations, the department may consider the potential for regional increases in utility rates, taxation levels or recoverable costs associated with the production of goods or services that may result from the imposition of a strict no-degradation policy. Consideration may also be given to the possible indirect effects of a policy on per capita income and the level of employment in the geographical vicinity of the proposed pollution source. Any preliminary decision by the department to allow a limited lowering of water quality will be stated as such in a public notice issued pursuant to 10 CSR 20-6.010. Pursuant to that provision, a public hearing will be held in the geographical vicinity of the proposed pollution source, if the department determines there is significant public interest in and need for a hearing.

(C) **Tier Three.** There shall be no lowered water quality in outstanding national resource waters or outstanding state resource waters, as designated in Tables D and E.

(D) The three levels of protection provided by the antidegradation policy in subsections A through C of this section shall be implemented according to procedures developed by the department. The antidegradation implementation procedure shall go through stakeholder development and the finalized procedure shall be referenced by this rule before it becomes effective.

(4) Specific Criteria. The specific criteria shall apply to classified waters. Protection of drinking water supply is limited to surface waters designated for raw drinking water supply and aquifers. Protection of whole-body-contact recreation is limited to classified waters designated for that use. Only waters designated for livestock and wildlife watering are considered to be long-term supplies and are subject to the chronic toxicity requirements of the specific criteria.

(A) The maximum chronic toxicity criteria in Tables A and B shall apply to waters designated for the indicated uses given in Tables G and H. All Table A and B criteria are chronic toxicity criteria, except those specifically identified as acute criteria. Water contaminants shall not cause or contribute to concentrations in excess of these

values. Table A values listed as health advisory levels shall be used in establishing discharge permit limits and management strategies until additional data becomes available to support alternative criteria, or other standards are established. However, exceptions may be granted in the following cases:

1. Permanent flow streams when the stream flow is less than seven (7)-day Q10;
2. Regulated flow streams if the flow is less than the minimum release flow agreed upon by the regulating agencies;
- [3. When natural upstream concentration of dissolved oxygen are below the criteria, wasteload allocations and permits for point source discharges will be developed so that existing natural dissolved oxygen concentrations, as determined on a regional or watershed basis, are maintained;]*
- [4]* 3. For the natural and unavoidable chemical and physical changes that occur in the hypolimnion of lakes. Streams below impoundments shall meet applicable specific criteria;
- [5]* 4. For mixing zones.
 - A. The mixing zone shall be exempted from the chronic criteria requirements of this section for those components of waste that are rendered nontoxic by dilution, dissipation or rapid chemical transformation. Acute numeric criteria of Tables A and B and whole effluent acute toxicity requirements of subsection (3)(I) must be met at all times within the mixing zone, except within the zone of initial dilution. The following criteria do not apply to thermal mixing zones. Criteria for thermal mixing zones are listed in paragraph (4)(D)6.
 - B. The maximum size of mixing zones and zone of initial dilution will be determined as follows:
 - (I) *[Class C streams and s]*Streams with seven (7)-day Q10 low flows of **less than 0.1 cfs [or less]**.
 - (a) Mixing zone—*[length of one-quarter (1/4) mile. If multiple discharges affect a reach or if zone of passage requirements mandate less extensive mixing zones, shorter mixing zones may be required.]*
not allowed; and
 - (b) Zone of initial dilution—not allowed;
 - (II) Streams with seven (7)-day Q10 low flow of one-tenth to twenty (0.1- 20) cfs-
 - (a) Mixing zone—one-quarter (1/4) of the stream width, cross-sectional area or volume of flow; length one-quarter (1/4) mile. If the discharger can document that rapid and complete mixing of the effluent occurs in the receiving stream, the mixing zone may be up to one-half (1/2) of the stream width, cross-sectional area or volume of flow; and
 - (b) Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area or volume of flow;
 - (III) Streams with seven (7)-day Q10 low flow of greater than twenty (20) cfs-
 - (a) Mixing zone—one-quarter (1/4) of stream width, cross-sectional area or volume of flow; length of one-quarter (1/4) mile; and
 - (b) Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area or volume of flow and no more than ten (10) times the effluent design flow volume unless the use of diffusers or specific mixing zone studies can justify more dilution; and
 - (IV) Lakes.
 - (a) Mixing zone—not to exceed one-quarter (1/4) of the lake width at the discharge point or one hundred feet (100') from the discharge point, whichever is less.
 - (b) Zone of initial dilution—not allowed.
 - C. A mixing zone shall not overlap another mixing zone in a manner that the maintenance of aquatic life in the body of water in the overlapping area would be further adversely affected.
 - D. Other factors that may prohibit or further limit the size and location of mixing zones are the size of the river, the volume of discharge, the stream bank configuration, the mixing velocities, other hydrologic or physiographic characteristics and the designated uses of the water, including type of aquatic life supported, potential effects on mouths of tributary streams and proximity to water supply intakes.
 - E. Zones of passage must be provided wherever mixing zones are allowed.
 - F. Mixing zone and zone of initial dilution size limits will normally be based on streams at the seven (7)-day Q10 low flow. However, this percent of stream size limits also applies at higher stream flows and discharge limitations may be based on higher stream flows if discharge volume or quality may be adjusted to correlate with stream flow; and
- [6]* 5. For wetlands. Water quality needs will vary depending on the individual characteristics of wetlands. Application of numeric criteria will depend on the specific aquatic life, wildlife and vegetational requirements.

A. Specific criteria for wetlands shall be developed using scientific procedures including, but not limited to, those procedures described in the U.S. Environmental Protection Agency's "Water Quality Standards Handbook," Second Edition, August 1994.

B. Specific criteria shall protect all life stages of species associated with wetlands and prevent acute and chronic toxicity in all parts of the wetland.

C. Specific criteria shall include both chronic and acute concentrations to better reflect the different tolerances to the inherent variability between concentrations and toxicological characteristics of a condition.

D. Specific criteria shall be clearly identified as maximum "not to be exceeded" or average values, and if an average, the averaging period and the minimum number of samples. The conditions, if any, when the criteria apply shall be clearly stated (e.g., specific levels of hardness, pH, or water temperature). Specific sampling requirements (e.g., location, frequency), if any, shall also be identified.

E. The data, testing procedures, and application (safety) factors used to develop specific criteria shall reflect the nature of the condition (e.g., persistency, bioaccumulation potential) and the most sensitive species associated with the wetland.

F. Each specific criterion shall be promulgated into rule within subchapter 10 CSR 20-7.031. The public notice shall include a description of the affected wetland and the reasons for applying the proposed criterion. A public hearing may be held in the geographical vicinity of the affected wetland. Any specific criterion promulgated under these provisions is subject to U.S. EPA approval prior to becoming effective.

(B) Toxic Substances.

1. Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded. More stringent criteria may be imposed if there is evidence of additive or synergistic effects. *[Site-specific criteria modifications may be allowed. With the department's approval, entities may conduct studies to determine if site-specific factors would justify modifications in the criteria that apply to specific receiving waters. In approving a study and reviewing its results, the department will take into account EPA and other appropriate guidelines as they exist at the time the study is submitted for approval.]*

2. For compliance with this rule, metals shall be analyzed by the following methods:

A. Aquatic life protection and human-health protection fish consumption.

(I) Mercury—total recoverable metals.

(II) All other metals—dissolved metals;

B. Drinking water supply—**total recoverable metals; and** *[--dissolved metals;]*

C. All other beneficial uses—total recoverable metals.

3. Other potentially toxic substances for which sufficient toxicity data are not available may not be released to waters of the state until safe levels are demonstrated through adequate bioassay studies.

4. Drinking water criteria, for substances which are rendered nontoxic by transformation processes in the surface water body, shall apply at water supply withdrawal points.

5. Site-specific alternative criteria for human health fish consumption may be allowed. Designation of this site-specific criteria must follow the established variance request process.

6. Metals criteria for which toxicity is hardness dependent are in equation format in Table A.

7. Total Ammonia Nitrogen. For any given sample, the total ammonia nitrogen criteria shall be based on the pH and temperature of the water body measured at the time of each sample at the point of compliance.

A. The acute criteria shall not be exceeded at any time except in those waters for which the department has allowed a zone of initial dilution (ZID). The 1-day Q10 low flow condition will be used in determining acute total ammonia nitrogen criteria.

B. The chronic criteria shall not be exceeded except in water segments for which the department has allowed a mixing zone (MZ). The chronic criteria shall be based on a thirty (30) day exposure period. Therefore, the 30-day Q10 low flow condition of the receiving water body will be used in determining chronic total ammonia nitrogen criteria.

C. Without sufficient and reliable data, it is assumed that early life stages are present and must be protected at all times of the year.

(I) Sufficient and reliable data shall include, but is not limited to, seasonal studies on the fish species distributions, spawning periods, nursery periods, duration of sensitive life stages, and water

body temperature. Best professional judgement from fisheries biologists and other scientists will be considered as appropriate.

(II) The timeframes during the year when early life stages are considered to be absent are those time periods when early life stages are present in numbers that, if chronic toxicity did occur, would not affect the long-term success of the populations.

(III) A source of information for determining the duration of early life stages is *The American Society for Testing and Materials (ASTM) Standard E-1241*, “Standard Guide for Conducting Early Life-Stage Toxicity Tests with Fishes.”

(IV) Protection of early life stages should include the most sensitive species that have used a water body for spawning and rearing since November 28, 1975.

(C) *[Fecal Coliform]* Bacteria. Protection[s] of whole [-]body [-]contact recreation is limited to classified waters designated for that use. *[For periods when the stream or lake is not affected by storm water runoff]* **Either of the following bacteria criterion shall apply until a date three (3) years from the effective date of this rule; at which time, only *E. coli* criterion shall apply. The recreational season is from April 1 to October 31.**

1. **Fecal coliform bacteria**—the fecal coliform count shall not exceed *[two hundred colonies per one hundred milliliters (200/100 mL)]* **the criterion listed in Table A as a geometric mean** during the recreational season in waters designated for whole [-]body [-]contact recreation~~/or]~~. **The fecal coliform count shall not exceed two hundred (200) colonies per one hundred milliliters (100 mL) at any time in losing streams. *[The recreational season is from April 1 to October 31.]* For waters designated for secondary contact recreation, the fecal coliform count shall not exceed one thousand eight hundred (1,800) colonies per one hundred milliliters (100 mL) as a geometric mean during the recreational season. -or-**

2. ***E. Coli* bacteria**—the *E. coli* count shall not exceed the criterion listed in Table A as a geometric mean during the recreational season in waters designated for whole-body-contact recreation. **The *E. coli* count shall not exceed one hundred twenty-six (126) colonies per one hundred milliliters (100 mL) at any time in losing streams. For waters designated for secondary contact recreation, the fecal coliform count shall not exceed one thousand one hundred thirty-four (1,134) colonies per one hundred milliliters (100 mL) as a geometric mean during the recreational season.**

(D) Temperature.

1. For general and limited warm-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5°F) **or two and seven-ninths degrees Celsius (2 7/9 °C)**. Water contaminant sources shall not cause or contribute to stream temperature in excess of ninety degrees Fahrenheit (90°F) **or thirty-two and two-ninths degrees Celsius (32 2/9 °C)**. However, site-specific ambient temperature data and requirements of sensitive resident aquatic species will be considered, when data are available, to establish alternative maxima or deviations from ambient temperatures.

2. For cool-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5°F) **or two and seven-ninths degrees Celsius (2 7/9 °C)**. Water contaminant sources shall not cause or contribute to stream temperature in excess of eighty-four degrees Fahrenheit (84°F) **or twenty-eight and eight-ninths degrees Celsius (28 8/9 °C)**.

3. For cold-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of the water body more than two degrees Fahrenheit (2°F) **or one and one-ninths degrees Celsius (1 1/9 °C)**. Water contaminant sources shall not cause or contribute to temperatures above sixty-eight degrees Fahrenheit (68°F) **or twenty degrees Celsius (20 °C)**.

4. Water contaminant sources shall not cause any measurable rise in the temperature of lakes. An increase is allowable for Lake Springfield, Thomas Hill Reservoir and Montrose Lake; however, discharges from these lakes must comply with temperature limits for streams.

5. For the Mississippi River Zones 1A and 2, the water temperature outside the mixing zone shall not exceed the maximum limits indicated in the following list during more than one percent (1%) of the time in any calendar year. In Zone 1B, limits may not be exceeded more than five percent (5%) of the time in a calendar year. At no time shall the river water temperature outside of the thermal mixing zone exceed the listed limits by more than three degrees Fahrenheit (3°F) **or one and six-ninths degrees Celsius (1 6/9 °C)**.

	A & B		C	
	(°F)	(°C)	(°F)	(°C)
January	45	7 2/9	50	10
February	45	7 2/9	50	10
March	57	13 8/9	60	15 5/9
April	68	20	70	21 1/9
May	78	25 5/9	80	26 6/9
June	86	30	87	30 5/9
July	88	31 1/9	89	31 6/9
August	88	31 1/9	89	31 6/9
September	86	30	87	30 5/9
October	75	23 8/9	78	25 5/9
November	65	18 3/9	70	21 1/9
December	52	11 1/9	57	13 8/9

A = Zone 1A Des Moines River to Lock and Dam No. 25.
 B = Zone 1B Lock and Dam No. 25 to Lock and Dam No. 26.
 C = Zone 2 Lock and Dam No. 26 to the Missouri-Arkansas state line.

6. Thermal mixing zones shall be limited to twenty-five percent (25%) of the cross-sectional area or volume of a river, unless biological surveys performed in response to section 316(a) of the federal Clean Water Act (or equivalent) indicate no significant adverse impact on aquatic life. Thermal plume lengths and widths within rivers, and all plume dimensions within lakes, shall be determined on a case-by-case basis and shall be based on physical and biological surveys when appropriate.

(E) pH. Water contaminants shall not cause pH to be outside of the range of 6.5[-] to 9.0 **standard pH units**.

(F) Taste- and Odor-Producing Substances. Taste- and odor-producing substances shall be limited to concentrations in the streams or lakes that will not interfere with beneficial uses of the water. For those streams and lakes designated for drinking water supply use, the taste- and odor-producing substances shall be limited to concentrations that will not interfere with the production of potable water by reasonable water treatment processes.

(G) Turbidity and Color. Water contaminants shall not cause or contribute to turbidity or color that will cause substantial visible contrast with the natural appearance of the stream or lake or interfere with beneficial uses.

(H) Solids. Water contaminants shall not cause or contribute to solids in excess of a level that will interfere with beneficial uses. The stream or lake bottom shall be free of materials which will adversely alter the composition of the benthos, interfere with the spawning of fish or development of their eggs or adversely change the physical or chemical nature of the bottom.

(I) Radioactive Materials. All streams and lakes shall conform with state and federal limits for radionuclides established for drinking water supply.

(J) Dissolved Oxygen. Water contaminants shall not cause the dissolved oxygen to be lower than the levels described in Table A or as indicated in paragraph (4)(A)3.

(K) Total Dissolved Gases. Operation of impoundments shall not cause the total dissolved gas concentrations to exceed one hundred ten percent (110%) of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(L) Sulfate and Chloride Limit for Protection of Aquatic Life.

1. Streams with seven (7)-day Q10 low flow of less than one (1) cubic foot per second. The concentration of chloride plus sulfate shall not exceed one thousand milligrams per liter (1000 mg/l) *[at the seven (7)-day Q10 low flow]*. Table A includes additional chloride criteria.

2. Class P1, L1, L2 and L3 waters and streams with seven (7)-day Q10 low flow of more than one (1) cubic foot per second. The total chloride plus sulfate concentration shall not exceed the estimated natural background concentration by more than twenty percent (20%) at the sixty (60)-day Q10 low flow.

[3. If higher concentrations can be demonstrated through bioassays or studies not to be detrimental to indigenous aquatic life, then an appropriate higher concentration shall be allowed.]

(M) Carcinogenic Substances. Carcinogenic substances shall not exceed concentrations in water which correspond to the 10^{-6} cancer risk rate. This risk rate equates to one (1) additional cancer case in a population of one (1) million with lifetime exposure. Derivation of this concentration assumes average water and fish consumption amounts. Assumptions are two (2) liters of water and 6.5 grams of fish consumed per day. Federally established

final maximum contaminant levels for drinking water supply shall supersede drinking water supply criteria developed in this manner.

(N) All methods of sample collection, preservation and analysis used in applying criteria in these standards shall be in accord with those prescribed in the latest edition of Standard Methods for the Examination of Water and Wastewater or other procedures approved by the Environmental Protection Agency and the Missouri Department of Natural Resources.

(O) Criteria to protect designated uses are based on current technical literature, especially the Environmental Protection Agency's publication, Quality Criteria for Water, 1986. Criteria may be modified or expanded as additional information is developed or as needed to define narrative criteria for particular situations or locations.

(P) WET Chronic Tests. Chronic WET tests performed at the percent effluent at the edge of the mixing zone shall not be toxic to the most sensitive of at least two (2) representative, diverse species. Pollutant attenuation processes such as volatilization and biodegradation which may occur within the allowable mixing zone will be considered in interpreting results.

(Q) Biocriteria. The biological integrity of waters, as measured by lists or numeric diversity indices of benthic invertebrates, fish, algae or other appropriate biological indicators, shall not be significantly different from reference waters. Waters shall be compared *[with]* to reference waters of similar size within an ecoregion. Reference water locations are listed in Table I.

(R) Site-specific Criteria Development for the Protection of Aquatic Life. When water quality criteria in this regulation are either underprotective or overprotective of water quality due to natural, non-anthropogenic conditions for a given water body segment, a petitioner may request site-specific criteria. The petitioner must provide the department with sufficient documentation to show that the current criteria are not adequate and that the proposed site-specific criteria will protect all existing and/or potential uses of the water body.

1. Site-specific criteria may be appropriate where, but is not limited to:

A. The resident aquatic species of the selected water body have a different degree of sensitivity to a specific pollutant as compared to those species in the data set used to calculate the national or state criteria.

(I) Natural adaptive processes have enabled a viable, balanced aquatic community to exist in waters where natural (non-anthropogenic) background conditions exceed the criterion (e.g., resident species have evolved a genetically based greater tolerance to high concentrations of a chemical).

(II) The composition of aquatic species in a water body is different from those used in deriving a criterion (e.g., most of the species considered among the most sensitive, such as salmonids or the cladoceran, *Daphnia dubia*, which were used in developing a criterion, are absent from a water body).

B. The physical and/or chemical characteristics of the water body alter the biological availability and/or toxicity of the pollutant (e.g., pH, alkalinity, salinity, water temperature, hardness).

2. All petitioners seeking to develop site-specific criteria shall coordinate with the department early in the process. This coordination will insure the use of adequate, relevant, and quality data; proper analysis and testing; and defensible procedures. The department will provide guidance for establishing site-specific water quality criteria using scientific procedures including, but not limited to, those procedures described in the U. S. Environmental Protection Agency's "Water Quality Standards Handbook," Second Edition, August 1994.

3. Site-specific criteria shall protect all life stages of resident species and prevent acute and chronic toxicity in all parts of a water body.

4. Site-specific criteria shall include both chronic and acute concentrations to better reflect the different tolerances of resident species to the inherent variability between concentrations and toxicological characteristics of a chemical.

5. Site-specific criteria shall be clearly identified as maximum "not to be exceeded" or average values, and if an average, the averaging period and the minimum number of samples. The conditions, if any, when the criteria apply shall be clearly stated (e.g., specific levels of hardness, pH, or water temperature). Specific sampling requirements (e.g., location, frequency), if any, shall also be identified.

6. The data, testing procedures, and application (safety) factors used to develop site-specific criteria shall reflect the nature of the chemical (e.g., persistency, bioaccumulation potential, and avoidance or attraction responses in fish) and the most sensitive resident species of a water body.

7. The size of a site may be limited to a single stream segment or may cover a whole watershed depending on the particular situation for which the specific criterion is developed. A group of water bodies may be considered one site if their respective aquatic communities are similar in composition and have comparable water quality.

8. The department shall determine if a site-specific criterion is adequate and justifiable. Each site-specific criterion shall be promulgated into rule within subchapter 10 CSR 20-7.031. The public notice shall include a description of the affected water body or water body segment and the reasons for applying the proposed criterion. If the department determines that there is significant public interest, a public hearing may be held in the geographical vicinity of the affected water body or water body segment. Any site-specific criterion promulgated under these provisions is subject to U.S. EPA approval prior to becoming effective.

(5) Groundwater.

(A) Water contaminants shall not cause or contribute to exceedence of Table A, *[Column VII]* **groundwater** limits in aquifers and caves. Table A values listed as health advisory levels shall be used in establishing management strategies and ground water cleanup criteria, until additional data becomes available to support alternative criteria or other standards are established. Substances not listed in Table A shall be limited so that drinking water, livestock watering and irrigation uses are protected.

(B) When criteria **for the protection of aquatic life or human health protection—fish consumption** in *[Column I or II of]* Table A are more stringent than *[Column VII]* **groundwater** criteria, appropriate *[Column I or II]* criteria **for the protection of aquatic life or human health protection—fish consumption** shall apply to waters in caves and to aquifers which contribute an important part of base flow of surface waters designated for aquatic life protection. Other substances not listed in Table A shall be limited in these aquifers and caves so that the aquatic life use is protected.

(C) *[Column VII]* **Groundwater** and other criteria shall apply in any part of the aquifer, including the point at which the pollutant enters the aquifer. A specific monitoring depth requirement for releases to aquifers is included in 10 CSR 20-7.015(7)(A).

(D) For aquifers in which contaminant concentrations exceed *[Column VII]* **groundwater** criteria or other protection criteria, and existing and potential uses are not impaired, alternative site-specific criteria may be allowed. To allow alternative criteria, the management authority must demonstrate that alternative criteria will not impair existing and potential uses. The demonstration must consider the factors and be subject to the review requirements of 10 CSR 20-7.015(7)(F).

(7) Outstanding National Resource Waters. *[Under section (2), antidegradation section of this rule, new releases to outstanding national resource waters from any source other than publicly-owned waste treatment facilities and mine dewatering water are prohibited and releases from allowed facilities]* **All discharges into these waters or into the watershed of these waters** are subject to special effluent limitations as required in 10 CSR 20-7.015(6)*[(A)(3)]*. Table D contains a list of **the outstanding national resource waters in Missouri**.

(8) Outstanding State Resources Waters. *[(A)]* The commission wishes to recognize certain high-quality water that may require exceptionally stringent water-quality management requirements to assure conformance with the antidegradation policy. *[The degree of management requirements will be decided on an individual basis.]* **All discharges into these waters or into the watershed of these waters are subject to special effluent limitations as required in 10 CSR 20-7.015(6). Table E contains a list of the outstanding state resource waters in Missouri.** *[To qualify for inclusion, all of the following criteria must be met.]* The waters listed in Table E must—

- [1]* **A.** Have a high level of aesthetic or scientific value;
- [2]* **B.** Have an undeveloped watershed; and
- [3]* **C.** Be located on or pass through lands which are state or federally owned, or which are leased or held in perpetual easement for conservation purposes by a state, federal, or private conservation agency or organization.

(10) **Compliance with Water Quality Based Limitations.** Compliance with new or revised National Pollutant Discharge Elimination System (NPDES) or Missouri operating permit limitations based on criteria in this rule shall be achieved with all deliberate speed and no later than three (3) years from the date of issuance of the permit.

AUTHORITY: sections 644.021 and 644.026, RSMo Supp. 1995. Original rule filed May 13, 1977, effective Dec. 11, 1977. Amended: Filed Oct. 15, 1980, effective April 11, 1981. Amended: Filed July 12, 1984, effective Dec. 13, 1984. Rescinded and readopted: Filed Aug. 4, 1987, effective Dec. 12, 1987. Amended: Filed Nov. 14, 1988, effective April 15, 1989. Rescinded and readopted: Filed Sept. 5, 1990, effective March 14, 1991. Amended: Filed Sept. 2, 1993, effective May 9, 1994. Amended: Filed Nov. 14, 1995, effective July 30, 1996. Amended: Filed March 1, 1996, effective Nov. 30, 1996. Amended: Filed August 15, 2004, effective month date, year.*

**Original authority: 644.021, RSMo 1972, amended 1973 and 644.026, RSMo 1972, amended 1973, 1987.*

Table A—Criteria for Designated Uses

[I]/AQL = Protection of Aquatic Life
 [II] = Human Health Protection—Fish Consumption
 [III]/DWS = Drinking Water Supply
 [IV]/GRW = [Irrigation] Groundwater
 [V]/LWW = Livestock, Wildlife Watering
 [VI]/WBC = Whole-Body-Contact Recreation
 [VII]/SCR = [Groundwater] Secondary Contact Recreation

Pollutant (µg/l)		[I]/AQL	[II]	[III]	[IV]	[V]	[VI]	[VII]
Chlorine (total residual)								
cold-water		2						
warm-water	chronic	10						
	acute	19						
Cyanide (amenable to chlorination)								
	chronic	5						
	acute	22						
Hydrogen sulfide (un-ionized)		2						

Pollutant (mg/l)		[I]/AQL	[II]	[III]/DWS	[IV]/GRW	[V]/LWW	[VI]	[VII]
Chloride	chronic	230(+)		250				
	acute	860(+)						
Sulfate		(+)		250				
Fluoride				4	4	4		[4]
Nitrate-N				10	10			[10]
Dissolved oxygen (minimum)								
warm-water and cool-water fisheries		5						
cold-water fisheries		6						
Oil and grease		10						

+See [subsection] 10 CSR 20-7.031(4)(L).

Pollutant (colonies/100 ml)	[I]/WBC-A	[II]/WBC-B	[III]/SCR	[IV]	[V]	[VI]	[VII]
Fecal Coliform Bacteria *	200		1800			[200]	
<i>E. coli</i> Bacteria *	126	548	1134				

*Geometric mean during the recreational season in waters designated for recreation or at any time in losing streams. The recreational season is from April 1 to October 31.

Pollutant [(°F)]	[I]/AQL	[II]	[III]	[IV]	[V]	[VI]	[VII]
Temperature (maximum)	°F °C						
warm-water	90 32 2/9						
cool-water	84 28 8/9						
cold-water	68 20						
Temperature (maximum change)							
warm-water	5 2 7/9						
cool-water	5 2 7/9						
cold-water	2 1 6/9						

Pollutant (percent saturation)	[I]/AQL	[II]	[III]	[IV]	[V]	[VI]	[VII]
Total Dissolved Gases	110%						

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[I]/AQL = Protection of Aquatic Life
 [II]/HHF = Human Health Protection—Fish Consumption
 [III]/DWS = Drinking Water Supply
 [IV]/IRR = Irrigation
 [V]/LWW = Livestock, Wildlife Watering
 [VI] = Whole-Body-Contact Recreation
 [VII]/GRW = Groundwater

Pollutant (µg/l)	[I]/AOL	[II]/HHF	[III]/DWS	[IV]/IRR	[V]/LWW	[VI][VII]/GRW
Metals (Non-hardness Dependant)						
Aluminum (acute)	750					
Antimony		4300	6			6
Arsenic	20		50	100		50
Barium			2000			2000
Beryllium	5		4	100		4
Boron				2000		[2000] 2000
Cadmium	* [<125 125—200 >200]		5			5
[chronic:]						
[CWF	1.1	1.4	1.8]			
[Lakes	9.1	9.1	9.1]			
[GWWF	9.1	11.8	15.5]			
[LWWF	11.8	16.4	20]			
[acute:]						
[CWF	3.7	5.9	8.1]			
[Lakes & GWWF	31	49	68]			
[LWWF	43	68	94]			
Chromium II	* [<125 125—200 >200]		100	100		100
[chronic:]						
[Lakes	11 µg/l]					
[CWF, GWWF	42]					
[LWWF	190]					
[acute:]						
[Lakes	16 µg/l]					
[CWF & GWWF	62]					
[LWWF	280]					
Chromium VI						
chronic	10					
acute	15					
Cobalt					1000	1000
Copper	* [<125 125—200 >200]		1300		500	1300
[chronic:]						
[Lakes, CWF, GWWF	19 µg/l	28	36]			
[LWWF	29	41	53]			
[acute:]						
[Lakes, CWF, GWWF	29	43	56]			
[LWWF	44	64	84]			
Iron	1000		300			300
Lead	* [<125 125—200 >200]		15			15
[chronic:]						
[all waters	9	16	23]			
[acute:]						
[all waters	63	104	150]			

[CWF = Cold-water fishery
 GWWF = General warm-water fishery
 LWWF = Limited warm-water fishery]
 *See Metals (Hardness Dependant)

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[I]**AQL** = Protection of Aquatic Life
 [II]**HHF** = Human Health Protection—Fish Consumption
 [III]**DWS** = Drinking Water Supply
 [IV]**IRR** = Irrigation
 [V]**LWW** = Livestock, Wildlife Watering
 [VI] = *Whole-Body-Contact Recreation*
 [VII]**GRW** = Groundwater

Pollutant (µg/l)	[I] AOL	[II] HHF	[III] DWS	[IV] IRR	[V] LWW	[VI] [VII] GRW
Metals (Non-hardness Dependant) continued						
Manganese				50		50
Mercury				2		2
	chronic:	0.5				
	[all waters	0.5]				
	acute:	2.4				
	[all waters	2.4]				
Nickel		*		100		100
		[Hardness]				
		[<125 125—200 >200]				
	[chronic:]					
	[Lakes	160 220 280]				
	[CWF, GWWF	360 500 650]				
	[LWWF	425 600 770]				
	[acute:]					
	[Lakes	1400 2000 2500]				
	[CWF, GWWF	3200 4600 5800]				
	[LWWF	3800 5400 6900]				
Selenium		5		50		50
Silver		*		50		50
		[Hardness]				
		[<125 125—200 >200]				
	[acute:]					
	[all waters	3.5 7 11]				
Thallium			6.3	2		2
Zinc		*		5000		5000
		[Hardness]				
		[<125 125—200 >200]				
	[chronic:]					
	[CWF	172 236 305]				
	[Lakes	103 147 187]				
	[GWWF	241 340 433]				
	[LWWF	1050 1483 1893]				
	[acute:]					
	[CWF	185 264 337]				
	[Lakes	112 161 205]				
	[GWWF	264 371 479]				
	[LWWF	1154 1623 2073]				

[CWF = Cold-water fishery

GWWF = General warm-water fishery

LWWF = Limited warm-water fishery]

*See Metals (Hardness Dependant)

AQL = Protection of Aquatic Life

Pollutant (µg/L)		AQL							
Metals (Hardness Dependant)									
<u>Cadmium (µg/L)</u>	Acute:	$e^{(1.0166*\ln(\text{Hardness}) - 3.062490)} * (1.136672 - (\ln(\text{Hardness})*0.041838))$							
	Chronic:	$e^{(0.7409*\ln(\text{Hardness}) - 4.719948)} * (1.101672 - (\ln(\text{Hardness})*0.041838))$							
<u>Chromium III (µg/L)</u>	Acute:	$e^{(0.8190*\ln(\text{Hardness}) + 3.725666)} * \mathbf{0.316}$							
	Chronic:	$e^{(0.8190*\ln(\text{Hardness}) + 0.684960)} * \mathbf{0.860}$							
<u>Copper (µg/L)</u>	Acute:	$e^{(0.9422*\ln(\text{Hardness}) - 1.700300)} * \mathbf{0.960}$							
	Chronic:	$e^{(0.8845*\ln(\text{Hardness}) - 2.044953)} * \mathbf{0.960}$							
<u>Lead (µg/L)</u>	Acute:	$e^{(1.273*\ln(\text{Hardness}) - 1.460448)} * (1.46203 - (\ln(\text{Hardness})*0.145712))$							
	Chronic:	$e^{(1.273*\ln(\text{Hardness}) - 4.704797)} * (1.46203 - (\ln(\text{Hardness})*0.145712))$							
<u>Nickel (µg/L)</u>	Acute:	$e^{(0.8460*\ln(\text{Hardness}) + 2.255647)} * \mathbf{0.998}$							
	Chronic:	$e^{(0.8460*\ln(\text{Hardness}) + 0.058978)} * \mathbf{0.997}$							
<u>Silver (µg/L)</u>	Acute:	$e^{(1.72*\ln(\text{Hardness}) - 6.588144)} * \mathbf{0.850}$							
<u>Zinc (µg/L)</u>	Acute:	$e^{(0.8473*\ln(\text{Hardness}) + 0.884211)} * \mathbf{0.978}$							
	Chronic:	$e^{(0.8473*\ln(\text{Hardness}) + 0.785271)} * \mathbf{0.986}$							

	Hardness								
	50-74	75-99	100-124	125-149	150-174	175-199	200-224	225-249	250+
Cadmium									
Acute:	2.4	3.6	4.8	5.9	7.1	8.2	9.4	10.5	11.6
Chronic:	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5
Chromium III									
Acute:	323	450	570	684	794	901	1005	1107	1207
Chronic:	42	59	74	89	103	117	131	144	157
Copper									
Acute:	7	10	13	17	20	23	26	29	32
Chronic:	4	6	7	9	10	12	13	15	16
Lead									
Acute:	30	47	65	82	100	118	136	154	172
Chronic:	1	2	3	3	4	5	5	6	7
Nickel									
Acute:	261	367	469	566	660	752	842	930	1017
Chronic:	29	41	52	63	73	84	94	103	113
Silver									
Acute:	1.0	2.0	3.2	4.7	6.5	8.4	10.6	13.0	15.6
Zinc									
Acute:	65	92	117	142	165	188	211	233	255
Chronic:	59	84	107	129	151	172	193	213	233

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[I]AQL = Protection of Aquatic Life
 [II]HHF = Human Health Protection—Fish Consumption
 [III]DWS = Drinking Water Supply
 [IV] = Irrigation
 [V] = Livestock, Wildlife Watering
 [VI] = Whole-Body-Contact Recreation
 [VII]GRW = Groundwater

Pollutant (µg/l)	[I]AQL	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
Organics							
2,4,6-trichlorophenol		[7] 6.5	2				2
1,2,4,5-tetrachlorobenzene		2.9	[38] 2.3				[38] 2.3
pentachlorobenzene		[85] 4.1	[74] 3.5				[74] 3.5
n-nitrosopyrrolidene		[93] 91.9					

Pollutant (µg/l)	[I]AQL	[II]	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
Pesticides							

Pollutant (µg/l)	[I]AQL	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
[Persistent,] Bioaccumulative, [Man-Made] Anthropogenic Toxics (+)							
4-4'-dichlorodiphenyltrichloroethane (DDT) [and metabolites]		[.002] 0.00059	[.002] 0.00059				[.002] 0.00059
4-4'-dichlorodiphenyldichloroethylene (DDE)		0.00059	0.00059				0.00059
4-4'-dichlorodiphenyldichloroethane (DDD)		0.00084	0.00083				0.00083
2,3,7,8-tetrachlorodibenzo-p-dioxin (ng/l)* (TCDD or dioxin)		.000014	[.03] 0.000013				[.03] 0.000013

Pollutant (µg/l)	[I]	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
[Persistent, Manmade] Anthropogenic Carcinogens(+) [µg/l]							
Bis (chloromethyl) ether		[.07] 0.00078	0.0001[6]3				0.0001[6]3

Pollutant (µg/l)	[I]	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
Volatile Organics							
Trihalomethanes			[100] 80				[100] 80
Bromoform		[365] 360	4.3				4.3
Chlorodibromomethane		[35] 34	0.41				0.41
Dichlorobromomethane		46	0.56				0.56
Chloroform		470	5.7				5.7
Methylene Chloride		1600	[5] 4.7				[5] 4.7
Tetrachloroethylene		[9] 8.85	[5] 0.8				[5] 0.8
1,2-dichloropropane		39	[100] 0.52				[100] 0.52

Pollutant (fibers/l)	[I]	[II]	[III]DWS	[IV]	[V]	[VI]	[VII]
Asbestos							

Pollutant (µg/l)	[I]	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
Polynuclear Aromatic Hydrocarbons							

Pollutant (µg/l)	[I]	[II]HHF	[III]DWS	[IV]	[V]	[VI]	[VII]GRW
Phthalate Esters							

Health Advisory Levels							
Pollutant (µg/l)	[I]	[II]	[III]DWS	[IV]	[V]	[VI]	[VII]GRW

Health Advisory Levels (continued)							
Pollutant (µg/l)	[I]	[II]	[III]DWS	[IV]	[V]	[VI]	[VII]GRW

[Table B

Chronic Criteria for Total Ammonia: Cold-Water Fishery (mg/l)

<i>Temp.</i> <i>°C</i>	<i>pH</i>												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	2.4	2.4	2.4	2.4	2.4	2.4	2.1	1.5	0.9	0.6	0.4	0.2	0.2
6	2.3	2.3	2.3	2.3	2.3	2.3	2.0	1.4	0.9	0.6	0.4	0.2	0.2
8	2.3	2.3	2.3	2.3	2.3	2.3	2.0	1.4	0.9	0.6	0.4	0.2	0.2
10	2.2	2.2	2.2	2.2	2.2	2.3	1.9	1.4	0.9	0.6	0.4	0.2	0.2
12	2.2	2.2	2.2	2.2	2.2	2.2	1.9	1.3	0.9	0.6	0.4	0.2	0.2
14	2.2	2.2	2.2	2.2	2.2	2.2	1.9	1.3	0.9	0.6	0.4	0.2	0.2
16	2.8	2.8	2.8	2.8	2.8	2.8	2.4	1.7	1.1	0.7	0.5	0.3	0.2
18	2.4	2.4	2.4	2.4	2.4	2.5	2.1	1.5	1.0	0.6	0.4	0.3	0.2
20	2.1	2.1	2.1	2.1	2.1	2.1	1.8	1.3	0.8	0.6	0.4	0.2	0.2
22	1.8	1.8	1.8	1.8	1.8	1.8	1.6	1.1	0.7	0.5	0.3	0.2	0.2
24	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.0	0.6	0.4	0.3	0.2	0.1
26	1.4	1.4	1.4	1.4	1.4	1.4	1.2	0.9	0.6	0.4	0.3	0.2	0.1
28	1.2	1.2	1.2	1.2	1.2	1.2	1.1	0.8	0.5	0.3	0.2	0.2	0.1
30	1.0	1.0	1.0	1.0	1.1	1.1	0.9	0.7	0.4	0.3	0.2	0.1	0.1

NOTE: Values in this table are total ammonia concentration (HN₃). Typical analytical methods result in determinations of ammonia nitrogen and thus must be multiplied by 1.2 prior to comparison with values in this table.

Acute Criteria for Total Ammonia: Cold-Water Fishery (mg/l)

<i>Temp.</i> <i>°C</i>	<i>pH</i>												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	32.1	29.7	26.6	22.8	18.6	14.4	10.7	7.5	4.8	3.0	2.0	1.3	0.8
6	31.3	29.0	26.0	22.3	18.2	14.1	10.4	7.4	4.7	3.0	1.9	1.3	0.8
8	30.7	28.4	25.4	21.8	17.8	13.8	10.2	7.2	4.6	3.0	1.9	1.2	0.8
10	30.1	27.8	24.9	21.4	17.5	13.6	10.0	7.1	4.5	2.9	1.9	1.2	0.8
12	29.5	27.4	24.5	21.0	17.2	13.3	9.9	7.0	4.5	2.9	1.9	1.2	0.8
14	29.1	27.0	24.2	20.7	16.9	13.2	9.7	6.9	4.4	2.9	1.9	1.2	0.8
16	28.7	26.6	23.8	20.5	16.7	13.0	9.6	6.9	4.4	2.9	1.9	1.3	0.9
18	28.4	26.3	23.6	20.3	16.6	12.9	9.6	6.8	4.4	2.9	1.9	1.3	0.9
20	28.2	26.1	23.4	20.1	16.4	12.8	9.5	6.8	4.4	2.9	1.9	1.3	0.9
22	24.4	22.6	20.2	17.4	14.2	11.1	8.3	5.9	3.8	2.5	1.7	1.2	0.8
24	21.1	19.6	17.6	15.1	12.4	9.6	7.2	5.2	3.4	2.2	1.5	1.0	0.8
26	18.3	17.0	15.2	13.1	10.8	8.4	6.3	4.5	2.9	2.0	1.3	0.9	0.7
28	16.0	14.8	13.3	11.4	9.4	7.3	5.5	4.0	2.6	1.7	1.2	0.8	0.6
30	13.9	12.9	11.6	10.0	8.2	6.4	4.8	3.5	2.3	1.5	1.1	0.8	0.6

Chronic Criteria for Total Ammonia: Limited Warm-Water Fishery (mg/l)

<i>Temp.</i> <i>°C</i>	<i>pH</i>												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	3.9	3.9	3.9	3.9	3.9	3.9	3.4	2.4	1.5	1.0	0.6	0.4	0.3
6	3.8	3.8	3.8	3.8	3.8	3.9	3.3	2.3	1.5	0.9	0.6	0.4	0.3
8	3.8	3.8	3.8	3.8	3.8	3.8	3.2	2.3	1.5	0.9	0.6	0.4	0.3
10	3.7	3.7	3.7	3.7	3.7	3.7	3.2	2.3	1.4	0.9	0.6	0.4	0.3
12	3.6	3.6	3.6	3.6	3.6	3.6	3.1	2.2	1.4	0.9	0.6	0.4	0.3
14	3.6	3.6	3.6	3.6	3.6	3.6	3.1	2.2	1.4	0.9	0.6	0.4	0.3
16	3.5	3.5	3.5	3.5	3.5	3.6	3.0	2.2	1.4	0.9	0.6	0.4	0.3
18	3.5	3.5	3.5	3.5	3.5	3.5	3.0	2.2	1.4	0.9	0.6	0.4	0.3
20	3.4	3.4	3.5	3.5	3.5	3.5	3.0	2.1	1.4	0.9	0.6	0.4	0.3
22	3.0	3.0	3.0	3.0	3.0	3.0	2.6	1.9	1.2	0.8	0.5	0.4	0.3
24	2.6	2.6	2.6	2.6	2.6	2.6	2.3	1.6	1.1	0.7	0.5	0.3	0.2
26	2.2	2.2	2.3	2.3	2.3	2.3	2.0	1.4	0.9	0.6	0.4	0.3	0.2
28	2.0	2.0	2.0	2.0	2.0	2.0	1.7	1.3	0.8	0.5	0.4	2.7	0.2
30	1.7	1.7	1.7	1.7	1.7	1.8	1.5	1.1	0.7	0.5	0.3	0.2	0.2

Acute Criteria for Total Ammonia: Limited Warm-Water Fishery (mg/l)

Temp. °C	pH												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	81.2	75.2	67.3	57.7	47.1	36.5	27.0	19.1	12.1	7.7	5.0	3.2	2.1
6	79.2	73.4	65.7	56.4	46.0	35.7	26.4	18.7	11.9	7.6	4.9	3.2	2.1
8	77.5	71.8	64.3	55.2	45.1	34.9	25.8	18.3	11.7	7.5	4.8	3.1	2.1
10	76.0	70.4	63.1	54.1	44.2	34.3	25.4	18.0	11.5	7.4	4.8	3.1	2.1
12	74.7	69.2	62.0	53.2	43.5	33.7	25.0	17.7	11.3	7.3	4.7	3.1	2.1
14	73.6	68.2	61.1	52.4	42.9	33.3	24.6	17.5	11.2	7.2	4.7	3.1	2.1
16	72.6	67.3	60.3	51.8	42.3	32.9	24.4	17.4	11.2	7.0	4.7	3.2	2.2
18	71.8	66.6	59.7	51.2	41.9	32.6	24.2	17.3	11.1	7.2	4.8	3.2	2.2
20	71.2	66.0	59.1	50.8	41.6	32.4	24.0	17.2	11.1	7.2	4.8	3.3	2.3
22	70.7	65.6	58.8	50.5	41.4	32.2	24.0	17.2	11.1	7.3	4.9	3.4	2.4
24	70.4	65.3	58.5	50.3	41.2	32.1	23.9	17.2	11.2	7.4	5.0	3.5	2.5
26	65.5	60.7	54.5	46.9	38.4	30.0	22.4	16.1	10.5	7.0	4.8	3.3	2.5
28	57.0	52.9	47.4	40.8	33.5	26.2	19.6	14.1	9.3	6.2	4.3	3.0	2.3
30	49.7	46.1	41.4	35.6	29.3	22.9	17.2	12.4	8.2	5.5	3.8	2.8	2.1

Chronic Criteria for Total Ammonia: General Warm-Water Fishery (mg/l)

Temp. °C	pH												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	2.5	2.5	2.5	2.5	2.5	2.5	2.1	1.5	0.9	0.6	0.4	0.3	0.2
6	2.4	2.4	2.4	2.4	2.4	2.4	2.1	1.5	0.9	0.6	0.4	0.2	0.2
8	2.3	2.3	2.3	2.3	2.3	2.4	2.0	1.4	0.9	0.6	0.4	0.2	0.2
10	2.3	2.3	2.3	2.3	2.3	2.3	2.0	1.4	0.9	0.6	0.4	0.2	0.2
12	2.3	2.3	2.3	2.3	2.3	2.3	2.0	1.4	0.9	0.6	0.4	0.2	0.2
14	2.2	2.2	2.2	2.2	2.2	2.2	2.0	1.4	0.9	0.6	0.4	0.2	0.2
16	2.2	2.2	2.2	2.2	2.2	2.2	1.9	1.4	0.9	0.6	0.4	0.2	0.2
18	2.2	2.2	2.2	2.2	2.2	2.2	1.9	1.3	0.9	0.6	0.4	0.3	0.2
20	2.1	2.2	2.2	2.2	2.2	2.2	1.9	1.3	0.9	0.6	0.4	0.3	0.2
22	1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.2	0.8	0.5	0.3	0.2	0.2
24	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.0	0.7	0.4	0.3	0.2	0.1
26	1.4	1.4	1.4	1.4	1.4	1.4	1.2	0.9	0.6	0.4	0.3	0.2	0.1
28	1.2	1.2	1.2	1.2	1.2	1.2	1.1	0.8	0.5	0.3	0.2	0.2	0.1
30	1.1	1.1	1.1	1.1	1.1	1.1	0.9	0.7	0.5	0.3	0.2	0.2	0.1

Acute Criteria for Total Ammonia: General Warm-Water Fishery (mg/l)

Temp. °C	pH												
	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
4	50.6	46.9	42.0	36.0	29.4	22.8	16.8	11.9	7.6	4.8	3.1	2.0	1.3
6	49.4	45.8	41.0	35.2	28.7	22.3	16.4	11.6	7.4	4.7	3.0	2.0	1.3
8	48.3	44.8	40.1	34.4	28.1	21.8	16.1	11.4	7.3	4.7	3.0	2.0	1.3
10	47.4	44.0	39.3	33.7	27.6	21.4	15.8	11.2	7.2	4.6	3.0	2.0	1.3
12	46.6	43.2	38.7	33.2	27.1	26.0	15.6	11.1	7.1	4.6	3.0	2.0	1.3
14	45.9	42.5	38.1	32.7	26.7	20.8	15.4	10.9	7.0	4.5	3.0	2.0	1.3
16	45.3	42.0	37.6	32.3	26.4	20.5	15.2	10.8	7.0	4.5	3.0	2.0	1.4
18	44.8	41.5	37.2	32.0	26.1	20.3	15.1	10.8	7.0	4.5	3.0	2.0	1.4
20	44.4	41.2	36.9	31.7	25.9	20.2	15.0	10.7	6.9	4.5	3.0	2.0	1.4
22	44.1	40.9	36.6	31.5	25.8	20.1	14.9	10.7	6.9	4.6	3.0	2.1	1.5
24	43.9	40.7	36.5	31.4	25.7	20.0	14.9	10.7	7.0	4.6	3.1	2.2	1.6
26	40.8	37.9	34.0	29.0	24.0	18.7	14.0	10.0	6.6	4.4	3.0	2.1	1.5
28	35.5	33.0	29.6	25.5	20.9	16.3	12.2	8.8	5.8	3.9	2.7	1.9	1.4

Table B1. Acute Criteria for Total Ammonia Nitrogen (mg N/L)

pH	Cold-Water Fisheries ⁽¹⁾	Cool & Warm-Water Fisheries ⁽²⁾
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.6	14.4
7.8	8.1	12.1
7.9	6.7	10.1
8.0	5.6	8.4
8.1	4.6	6.9
8.2	3.8	5.7
8.3	3.1	4.7
8.4	2.5	3.8
8.5	2.1	3.2
8.6	1.7	2.6
8.7	1.4	2.2
8.8	1.2	1.8
8.9	1.0	1.5
9.0	0.8	1.3

Table B2. Chronic Criteria for Total Ammonia Nitrogen (mg N/L): Early Life Stages absent ⁽³⁾⁽⁴⁾

	Temperature (°C)																
pH	0-7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30
6.5	10.8	10.1	9.5	8.9	8.3	7.8	7.3	6.8	6.4	6.0	5.3	4.6	4.1	3.6	3.1	2.8	2.4
6.6	10.7	9.9	9.3	8.7	8.2	7.7	7.2	6.7	6.3	5.9	5.2	4.6	4.0	3.5	3.1	2.7	2.4
6.7	10.5	9.8	9.2	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.1	4.5	3.9	3.5	3.0	2.7	2.3
6.8	10.2	9.5	8.9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.0	4.4	3.8	3.4	3.0	2.6	2.3
6.9	9.9	9.3	8.7	8.1	7.6	7.2	6.7	6.3	5.9	5.5	4.8	4.3	3.7	3.3	2.9	2.5	2.2
7.0	9.6	9.0	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.3	4.7	4.1	3.6	3.2	2.8	2.4	2.1
7.1	9.2	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.4	5.1	4.5	3.9	3.5	3.0	2.7	2.3	2.0
7.2	8.7	8.2	7.6	7.2	6.7	6.3	5.9	5.5	5.2	4.9	4.3	3.7	3.3	2.9	2.5	2.2	1.9
7.3	8.2	7.7	7.2	6.7	6.3	5.9	5.6	5.2	4.9	4.6	4.0	3.5	3.1	2.7	2.4	2.1	1.8
7.4	7.6	7.2	6.7	6.3	5.9	5.5	5.2	4.8	4.5	4.3	3.7	3.3	2.9	2.5	2.2	1.9	1.7
7.5	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.4	3.0	2.6	2.3	2.0	1.8	1.6
7.6	6.4	6.0	5.6	5.3	5.0	4.6	4.3	4.1	3.8	3.6	3.1	2.7	2.4	2.1	1.9	1.6	1.4
7.7	5.8	5.4	5.1	4.7	4.0	4.2	3.9	3.7	3.4	3.2	2.8	2.5	2.2	1.9	1.7	1.5	1.3
7.8	5.1	4.8	4.5	4.2	4.4	3.7	3.5	3.2	3.0	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1
7.9	4.5	4.2	3.9	3.7	3.5	3.2	3.1	2.8	2.7	2.5	2.2	1.9	1.7	1.5	1.3	1.1	1.0
8.0	3.9	3.7	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	1.9	1.7	1.5	1.3	1.1	1.0	0.8
8.1	3.4	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.6	1.4	1.2	1.1	1.0	0.8	0.7
8.2	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.4	1.2	1.1	0.9	0.8	0.7	0.6
8.3	2.4	2.3	2.1	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.5
8.4	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.7	0.7	0.6	0.5	0.4
8.5	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4
8.6	1.4	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3
8.7	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2
8.8	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
8.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2
9.0	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1

Table B3. Chronic Criteria for Total Ammonia Nitrogen (mg N/L): Early Life Stages present ⁽⁵⁾

pH	Temperature (°C)									
	0	14	16	18	20	22	24	26	28	30
6.5	6.6	6.6	6.0	5.3	4.6	4.1	3.6	3.1	2.8	2.4
6.6	6.5	6.5	5.9	5.2	4.6	4.0	3.5	3.1	2.7	2.4
6.7	6.4	6.4	5.8	5.1	4.5	3.9	3.5	3.0	2.7	2.3
6.8	6.2	6.2	5.7	5.0	4.4	3.8	3.4	3.0	2.6	2.3
6.9	6.1	6.1	5.5	4.8	4.3	3.7	3.3	2.9	2.5	2.2
7.0	5.9	5.9	5.3	4.7	4.1	3.6	3.2	2.8	2.4	2.1
7.1	5.6	5.6	5.1	4.5	3.9	3.5	3.0	2.7	2.3	2.0
7.2	5.3	5.3	4.9	4.3	3.7	3.3	2.9	2.5	2.2	1.9
7.3	5.0	5.0	4.6	4.0	3.5	3.1	2.7	2.4	2.1	1.8
7.4	4.7	4.7	4.3	3.7	3.3	2.9	2.5	2.2	1.9	1.7
7.5	4.3	4.3	3.9	3.4	3.0	2.6	2.3	2.0	1.8	1.6
7.6	3.9	3.9	3.6	3.1	2.7	2.4	2.1	1.9	1.6	1.4
7.7	3.5	3.5	3.2	2.8	2.5	2.2	1.9	1.7	1.5	1.3
7.8	3.1	3.1	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1
7.9	2.8	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1	1.0
8.0	2.4	2.4	2.2	1.9	1.7	1.5	1.3	1.1	1.0	0.8
8.1	2.1	2.1	1.9	1.6	1.4	1.2	1.1	1.0	0.8	0.7
8.2	1.7	1.7	1.6	1.4	1.2	1.1	0.9	0.8	0.7	0.6
8.3	1.5	1.5	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.5
8.4	1.2	1.2	1.1	1.0	0.9	0.7	0.7	0.6	0.5	0.4
8.5	1.0	1.0	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4
8.6	0.9	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3
8.7	0.7	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2
8.8	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
8.9	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2
9.0	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1

- (1) *Salmonids present:* $CMC = [0.275 / (1+10^{7.204-pH})] + [39.0 / (1+10^{pH-7.204})]$
- (2) *Salmonids absent:* $CMC = [0.411 / (1+10^{7.204-pH})] + [58.4 / (1+10^{pH-7.204})]$
- (3) Without sufficient and reliable data, it is assumed that Early Life Stages are present and must be protected at all times of the year.
- (4) Early Life Stages absent
 $CCC = [0.0577 / (1+10^{7.688-pH})] + [2.487 / (1+10^{pH-7.688})] * 1.45 * 10^{0.028 * (25 - \text{MAX}(T, 7))}$
- (5) Early Life Stages present
 $CCC = [0.0577 / (1+10^{7.688-pH})] + [2.487 / (1+10^{pH-7.688})] * \text{MIN}(2.85, 1.45 * 10^{0.028 * (25 - T)})$

Table C
[Streams] **Waters** Designated for Cold-Water *[Sport]* Fishery

Water body	Miles/Acres		From	To	County(ies)
Bull Shoals Lake	9000	ac	21/34, 20N, 15W	— — —	Ozark
Indian Cr.	20	mi.	Mouth	36, 39N, 01W	Franklin-Washington
L. Piney Cr.	<i>[19]</i> 4	mi.	<i>[25,37N,9W]</i> 04, 35N, 08W	<i>[31,37N,08W]</i> 21, 35N, 08W	Phelps
N. Fk. White R.	<i>[13.5]</i> 23	mi.	<i>[3]</i> 09, 22N, 12W	<i>[28, 24N, 11W]</i> 34, 25N, 11W	Ozark
S. Indian Cr.	<i>[3.4]</i> 9	mi.	<i>[30,24N,30W]</i> 24, 24N, 31W	01, 23N, 30W	Newton-McDonald
Spring Cr.	<i>[3]</i> 6	mi.	Mouth	<i>[5]</i> 06, 24N, 13W	Douglas-Ozark

Table D
 Outstanding National Resource Waters

<i>[Stream]</i> Water body	Location	County(ies)
Current River	Headwaters to Northern Ripley Co. Line Sec. 22, 32N, 07W to Sec. 15, 25N, 01E	Dent to Ripley
Jacks Fork River	Headwaters to Mouth Sec. 29, 28N, 07W to Sec 9/15, 29N, 03W	Texas to Shannon
Eleven Point River	Headwaters to Hwy. 142 Sec. 32, 25N, 05W to Sec. 21, 22N, 02W	Oregon

Table E
 Outstanding State Resources Waters

Water body	Miles/Acres	Location	County(ies)
Blue Springs Cr.	4 mi. <i>[(1.5 mi. adjacent to owned lands)]</i>	Blue Spring Creek Conservation Area	Crawford
Bull Cr.	8 mi.	Mark Twain National Forest Sec. 24, 25N, 21W to Sec. 22, 26N, 20W	Christian

Table G
 Lake Classifications and Use Designations
 (See attachment.)

Table H
 Stream Classifications and Use Designations
 (See attachment.)

Table I
Biocriteria Reference Locations

STREAMS	COUNTIES	UPSTREAM LOCATION		DOWNSTREAM LOCATION					
Apple Creek <i>[Ash Slough Ditch]</i>	Cape Girardeau/Perry <i>[New Madrid]</i>	W 1/2	Sec. 29	T34N	R11E	NW <i>[TS]</i>	Sec. 3 <i>[Line 24N & 25N]</i>	T33N	R11E <i>[R13E]</i>
<i>Reason: Lack of water due to irrigation withdrawal.</i>									
Big Creek	Shannon	E 1/2	Sec. 12	T30N	R04W	N 1/2	Sec. 36	T30N	R04W
Big Sugar Creek	McDonald	SE	Sec. 1	T21N	R30W	NE	Sec. 21	T22N	R30W
Blair Creek	Shannon	SE	Sec. 25	T30N	R03W	NW	Sec. 18	T29N	R02W
Boeuf Creek	Franklin	SW	Sec. 36	T44N	R04W	NW	Sec. 30	T44N	R03W
Bryant Creek	Douglas	NW	Sec. 10	T25N	R14W	E 1/2	Sec. 15	T25N	R14W
Bull Creek	Christian/Taney	SE	Sec. 25	T25N	R21W	NE	Sec. 3	T24N	R21W
Burris Fork	Moniteau	NW	Sec. 6	T43N	R15W	NW	Sec. 28	T44N	R15W
Castor River	Madison	NW	Sec. 10	T33N	R08E	S 1/2	Sec. 16	T33N	R08E
Cedar Creek	Cedar	E 1/2	Sec. 29	T34N	R27W	N 1/2	Sec. 09	T34N	R27W
Center Creek	Lawrence	SE	Sec. 18	T27N	R28W	NE	Sec. 24	T27N	R29W
Deer Creek	Benton	SE	Sec. 31	T40N	R20W	NE	Sec. 30	T40N	R20W
East Fork Black River	Reynolds	NE	Sec. 08	T33N	R02E	SW	Sec. 16	T33N	R02E
East Fork Crooked River	Ray	NE	Sec. 02	T52N	R27W	SE	Sec. 14	T52N	R27W
East Fork Grand River	Worth	N 1/2	Sec. 32	T66N	R30W	NW	Sec. 13	T65N	R31W
Grindstone Creek	Dekalb	SW	Sec. 10	T58N	R30W	NW	Sec. 02	T58N	R30W
Heaths Creek	Pettis/Saline	SW	Sec. 20	T48N	R20W	N 1/2	Sec. 23	T48N	R20W
Honey Creek	Nodaway	SW	Sec. 25	T65N	R34W	SW	Sec. 25	T65N	R34W
Horse Creek	Cedar	SW	Sec. 09	T34N	R28W	N 1/2	Sec. 02	T34N	R28W
<i>[Huffstetter Lateral Ditch]</i>	<i>[Stoddard]</i>						<i>[Sec. Corner 17, 18, 19, 20]</i>	<i>[T24N]</i>	<i>[R11E]</i>
<i>Reason: Lack of water due to irrigation withdrawal.</i>									
Huzzah Creek	Crawford	SE	Sec. 29	T36N	R02W	NE	Sec. 18	T36N	R02W
Jacks Fork River	Texas/Shannon	SE	Sec. 35	T28N	R07W	NW	Sec. 04	T27N	R06W
Jones Creek	Jasper	N 1/2	Sec. 24	T27N	R31W	NW	Sec. 12	T27N	R31W
Little Black River	Ripley	E 1/2	Sec. 09	T24N	R03E	SE	Sec. 23	T24N	R03E
Little Drywood Creek	Vernon	NW	Sec. 06	T33N	R31W	SE	Sec. 30	T35N	R31W
Little Fox River	Clark	SE	Sec. 14	T66N	R09W	SE	Sec. 24	T66N	R09W
Little Maries River	Maries	SW	Sec. 34	T41N	R10W	W 1/2	Sec. 26	T41N	R10W
Little Niangua River	Hickory	NE	Sec. 26	T37N	R20W	S 1/2	Sec. 35	T38N	R20W
Little Piney Creek	Phelps	NE	Sec. 05	T35N	R08W	NE	Sec. 31	T36N	R08W
Little Whitewater River	Cape Girardeau	NW	Sec. 01	T32N	R09E	NE	Sec. 16	T32N	R10E
Locust Creek	Putnam	S 1/2	Sec. 10	T66N	R20W	NE	Sec. 34	T66N	R20W
Long Branch Platte River	Nodaway	SE	Sec. 30	T63N	R34W	NE	Sec. 29	T62N	R34W
Loutre River	Montgomery	E 1/2	Sec. 17	T48N	R06W	SE	Sec. 10	T47N	R06W
Main Ditch	Dunklin	S 1/2	Sec. 20	T20N	R10E	NE	Sec. 08	T19N	R10E
Maple Slough Ditch	Mississippi	NW	Sec. 34	T25N	R15E	Sec 3 & 4 Line		T24N	R15E
Marble Creek	Madison	E 1/2	Sec. 24	T32N	R04E	E 1/2	Sec. 21	T32N	R05E
Marrowbone Creek	Daviess	SW	Sec. 18	T58N	R27W	NE	Sec. 08	T58N	R27W
Meramec River	<i>[Crawford]</i> Dent	SE	Sec. 13	T35N	R05W	SW	Sec. 11	T35N	R05W
Middle Fabius River	Lewis	NE	Sec. 15	T62N	R09W	E 1/2	Sec. 04	T61N	R08W
Mikes Creek	McDonald	E 1/2	Sec. 15	T22N	R30W	SE	Sec. 16	T22N	R30W
Mill Creek	Phelps	NE	Sec. 08	T36N	R09W	NW	Sec. 28	T37N	R09W
Moniteau Creek	Cooper	SW	Sec. 20	T46N	R016W	E 1/2	Sec. 23	T46N	R16W
No Creek	Livingston/Grundy	S 1/2	Sec. 31	T60N	R23W	SE	Sec. 01	T59N	R24W
North Fork River	Douglas	SE	Sec. 12	T26N	R12W	SW	Sec. 19	T26N	R11W
North River	Marion	SE	Sec. 24	T58N	R08W	SE	Sec. 32	T58N	R07W
Petite Saline Creek	Cooper	W 1/2	Sec. 15	T48N	R16W	SE	Sec. 12	T48N	R16W

STREAMS	COUNTIES	UPSTREAM LOCATION			DOWNSTREAM LOCATION				
Pomme De Terre River	Polk	NE	Sec. 16	T31N	R20W	SW	Sec. 01	T31N	R21W
Richland Creek	Morgan	NW	Sec. 04	T43N	R18W	SE	Sec. 28	T44N	R18W
River Aux Vases	Ste. Genevieve	E 1/2	Sec. 33	T37N	R08E	SW	Sec. 26	T37N	R08E
Saline Creek	Miller	NW	Sec. 23	T41N	R14W	NW	Sec. 25	T41N	R14W
Saline Creek	Ste. Genevieve	NE	Sec. 35	T36N	R08E	SW	Sec. 32	T36N	R09E
Sinking Creek	Reynolds	SE	Sec. 32	T31N	R04W	NE	Sec. 35	T30N	R02E
Sinking Creek	Shannon	SE	Sec. 17	T30N	R02E	SE	Sec. 08	T30N	R04W
South Fabius River	Marion	S	Sec. 18	T59N	R08W	SE	Sec. 26	T59N	R08W
South River	Marion	NW	Sec. 06	T57N	R05W	SW	Sec. 21	T58N	R05W
Spring Creek	Adair	N 1/2	Sec. 14	T63N	R17W	NE	Sec. 30	T63N	R16W
Spring Creek	Douglas	NW	Sec. 26	T25N	R11W	NW	Sec. 34	T25N	R11W
Tavern Creek	Miller	NW	Sec. 07	T38N	R12W	NW	Sec. 33	T39N	R12W
Turnback Creek	Lawrence		Sec. 29	T29N	R25W	SE	Sec. 12	T29N	R26W
West Fork Big Creek	Harrison	NE	Sec. 15	T65N	R28W	SW	Sec. 22	T65N	R28W
West Locust Creek	Sullivan	SW	Sec. 03	T62N	R21W	N 1/2	Sec. 23	T62N	R21W
West Piney Creek	Texas	NW	Sec. 20	T30N	R10W	SW	Sec. 10	T30N	R10W
White Cloud Creek	Nodaway	NW	Sec. 06	T62N	R35W	SE	Sec. 18	T62N	R35W

PUBLIC COST: This proposed amendment and the proposed changes in 10 CSR 20-7.015, Effluent Regulations, will cost state agencies or political subdivisions two hundred thirty million three hundred eighty-six thousand three hundred fifty dollars (\$230,386,350) initially and forty-two million six thousand five hundred dollars (\$42,006,500) annually in the aggregate.

PRIVATE COST: This proposed amendment and the proposed changes in 10 CSR 20-7.015, Effluent Regulations, will cost private entities twenty million three hundred ninety-two thousand dollars (\$20,392,000) initially and twelve million three hundred forty-three thousand dollars (\$12,343,000) annually in the aggregate.

The cost and figures are included in the documentation for both rules though the cost will only be incurred once. Since the Effluent Regulations are tied so closely to the Water Quality Standards, the cost cannot be distinguished as part of one rule or the other. Therefore, the basis for the cost estimation and assumptions are also described in the fiscal note for Effluent Regulations and Regulatory Impact Report for both the Water Quality Standards and Effluent Regulations.

NOTICE OF PUBLIC HEARING AND NOTICE TO SUBMIT COMMENTS: Anyone may file a statement in support of or in opposition to this proposed amendment with Ms. Marlene Kirchner, Secretary, Missouri Clean Water Commission, P.O. Box 176, Jefferson City, MO 65102. To be considered comments must be received by [time] [date]. A public hearing is scheduled for [time], [date], in the [room] in the [building], [address]. Opportunity to be heard at the hearing shall be afforded any interested person. Written request to be heard should be submitted at least seven (7) days prior to the hearing to the Secretary of the Clean Water Commission.